Hardware Manual - Operation Instructions and Safety Guidelines

SEA 9404 GPS Module

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GmbH

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Getting Started

Before starting to work with the *SEA 9404 GPS Module* please read the complete hardware and software user manual and the following information carefully.

We believe that all information in this manual is accurate. The document has been carefully reviewed for technical accuracy. In the event of technical or typographical errors, we reserve the right to make changes to subsequent editions of this document without prior notice to holders of this edition.

The reader should consult the vendor if errors are suspected.

Before using or operating any SEA GPS Module and the provided software you have to agree to the terms and conditions. If you do NOT agree you can resend the hardware and software package within a period of two weeks after delivery. In this case S.E.A. will refund the product price and shipping costs.

The terms and conditions are listed in the software manual which is provided on the Installation CD ROM. Please read the manual chapters: *Disclaimer*, *Limitation of Liability*, and *User Responsibilities* before using the device.

For information about *National Instruments™* hardware please refer to the appropriate *National Instruments™* manual.

For information about installation, configuration, programming or operation of the SEA 9404 GPS Modules, please refer to the SEA 9404 GPS Module*s software manual*.

Overview

#	*Type/Functions*	*SEA 9404 GPS Module*
1	GPS update rate	4 Hz
2	Sync output front panel connector	●
3	Programmable Sync Output	●
4	PPS Timepulse routing to backplane	●
5	Programmable PPS Timepulse	●

● Option available ○ Option not available

These operating instructions describe how to use the SEA 9404 GPS Module. For information about software installation, configuration, programming of the Compact RIO system, please read the related software user manual carefully.

This manual describes the hardware operation and related issues.

If there are any questions about operating the module or if any term or description in this manual is not understood, please contact S.E.A. Datentechnik GmbH **before** operating the module.

Safety Guidelines

Operate the *SEA GPS Module* only as described in this operation instructions and the *SEA GPS Module* user manual. Please check the S.E.A. website for updates of this manual or technical specifications.

Hot or Cold Surface

Operated in hot or cold environments less than 10 °C or higher than 30 °C the metallic surface of the module might become hot or cold as well.

Touching the surface may result in bodily injury.

Do not dismount the module from the chassis during operation. Wait until the module temperature has reached 20 °C.

Do not disconnect I/O – wires or connectors unless power has been switched completely off and the area is known to be non hazardous.

Do not remove modules unless power has been switched completely off or the area is known to be non hazardous.

Guarantee void if seal is broken!

Safety Guidelines for Hazardous Locations

The *SEA GPS Module*s are suitable for use in non hazardous locations only. If unsure contact your vendor.

Please note:

- Do not use for medical applications.
- Do not use for autonomous navigation and/or control of any vehicle (e.g. planes, cars, trains, boats etc.).
- Do not use in safety critical applications.

Operator Protection

To protect persons against any harm, the following rules have to be obeyed:

- Use any part or the complete system only in dry areas. Do not operate the *SEA GPS Module* in bath areas, kitchens etc., where water or vapour can be in contact with the module, cables, or antennas.
- Use only isolated power supplies with a nominal voltage of 12 V DC, which are made to be used with CompactRIO systems.
- It is not allowed to use the system for any kind of medical application or live supporting apparatus.
- All *SEA GPS Modules* may not be operated in hospitals or similar environments.
- Keep the module and the antenna at least 1 meter away from human bodies during operation.
- The module must not be operated in explosive areas.

Prerequisites

To use the *SEA GPS Module* within the *National Instruments Compact RIO* system the following additional hardware is required:

- National Instruments Compact RIO system:
  - NI CompactRIO reconfigurable embedded system Real-Time controller,
  - NI CompactRIO chassis or a compact controller
- Peripheral hardware:
  - GPS antenna

For questions concerning the installation of the NI-CompactRIO hardware in general please consult the appropriate National Instruments user manuals at www.ni.com.

Installing

Before inserting the SEA 9404 GPS Module in the CompactRIO chassis, please disconnect any connectors to the CompactRIO system and switch-off the power supply. Make sure working in an ESD safe environment.

Front Side Connectors

The SEA 9404 *GPS* Module offers the following connectors and indicators:

- four status LEDs (1)
- Sync Output connector (2)
- GPS antenna connector (3)

Fig. 1: Connector Side

Wiring the SEA GPS Module

Follow the steps described below to connect the peripheral components to the front side of the *SEA 9404 GPS Module*.

1. Disconnect the CompactRIO system
2. GPS antenna

   Connect the GPS antenna to the GPS antenna connector socket.

   Use only antennas supplied for use with this module.
3. Sync Output connector

   Connect this output to any TTL compatible PPS Timepulse input.

Receiver Operation and Antenna Installation

The word receiver is used interchangeably with the word GPS module module, and means the RF-receiver or RF-receiver part of the GPS module.

The antenna has to be properly mounted at the desired location.

If a roof antenna is used, the antenna has to be dismounted when lightning strikes are likely. The SEA GPS Module and any antenna or cabling is NOT protected against lightning strikes or any over-voltage. Do NOT operate the transmitter or antenna during thunderstorms, and keep the antenna away from any kind of elevation. Keep the system away from hazardous locations, explosive- or high voltage areas.

Protect your system from thunderstorm and lightning strikes.

To minimize the radio frequency exposure to humans, the following rules have to be attended:

- When operating the transmitter, cabling and antennas, it is mandatory to keep a distance of at least 1 m to persons.
- Use only antenna types, which are foreseen for the use with the receiver. If unsure ask the module supplier.
- Use only antenna cables and connectors made for GPS systems and frequencies.
- Do not operate the SEA GPS Module and antenna near other RF systems.

- Do not open or disassemble the SEA GPS Module, antenna or other hardware parts.

Sleep Mode

The sleep mode can be enabled for the CompactRIO system by software. In sleep mode typically there is no communication with the module. Power consumption is minimized. The system thermal dissipation may decrease.

Refer to the *Specifications* section for more information about power consumption and thermal dissipation.

LED Indicators

The LEDs on the front side of the module are indicating by a green light:

LED #	SEA 9404 GPS module
1	na
2	na
3	Backplane Power Supply : OK = Green
4	GPS Status (PPS Timepulse) : OK when blinking at 1Hz

na=not applicable

Specifications

The following specifications are meant at a temperature of 20 °C unless otherwise noted.

The GPS Module is powered by the Compact RIO backplane connector (5 V).

Power Requirements & Operating Current

Module Type	Backplane current [A]	
	typical	sleep
SEA 9404	0.06*)	0.004

*) With active GPS-Patch antenna connected

The Sync Output connector supplies a TTL compatible voltage and current level.

Physical Characteristics

Weight	170-175 g
Size Overall	80 x 23 x 87 mm

Maintenance

The module should only be wiped with a dry towel. It is not water resistant.

The module does not contain components, which have to be serviced by the end customer.

Electromagnetic Compatibility

For EMC compliance, it is recommended to operate the SEA GPS Module with original and shielded antenna cabling only. For further information please refer to:

www.sea-gmbh.com

In order to satisfy the essential requisite of the R&TTE 99/5/EC directive, the SEA 9404 GPS Modules are compliant with the following standards:

- EMC (Electromagnetic Compatibility). Standards: EN 301 489-1 and EN 301 489-7.

This SEA 9404 GPS *Module* meets the essential requirements of the following US and Industry of Canada directives.

- EMC (Electromagnetic Compatibility).
- The product complies with the FCC Standard 47 Part 15

This product meets the essential requirements of applicable European Directives, as named for CE marking, as follows:
Electromagnetic Compatibility:

CE

Directive (EMC) 89/336/EEC

To meet the RF exposure rules and regulations above:

- The antennas used for this receiver have to be installed to provide a separation distance of at least 1 m from persons and must not be co-located or operating in conjunction with any other antenna or receiver/transmitter.

Environmental Conditions

SEA 9404 GPS Modules are intended for indoor use only. For outdoor use, mount the CompactRIO system in a suitable rated enclosure. Refer to the installation instructions for the chassis used for more information about meeting these specifications.

Module Type	**SEA 9404 GPS module**
Operating Temperature Range	-40 to 80°C
Storage Temperature	-25 to 60°C

Ingress protection ..... IP 30

Operating humidity ..... 5 to 90 % relative humidity, non condensing

Maximum altitude ..... 2000 m

Maximum speed 500km/h

Shock and Vibration

To meet these specifications, the module has to be panel mounted.

Operation vibration:

random (IEC 60068-2-64)	5 g_{rms} , 10 to 575 Hz
	Operation vibration,
sinusodial (IEC 60068-2-6)	5 g , 10 to 575 Hz
	Operation shock,
(IEC 60068-2-27)	15 g, 11 ms half sine,
	30 g, 11 ms half sine,
	50 g, 3 ms half sine,
	(10 shocks at 6 orientations)

Contact Information

S.E.A. Datentechnik GmbH is located at:

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53840 Troisdorf
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For support check the S.E.A. Datentechnik GmbH website:

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